C

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER M.TECH DEGREE EXAMINATION, DECEMBER 2015

(Electronics and Communication Engineering Department)

(Signal Processing)

(01EC6205   **ADVANCED DIGITAL COMMUNICATION**)

Max. Marks : 60   Duration:3 hours

Answer any two full questions from each part

PART A

1. (a) Prove that if signal s(t) in corrupted by AWGN,the filter with an impulse response matched to s(t) maximizes the output signal-to-noise ratio   (5)

   (b) Considering a signal communication system that transmits information in QAM over a voice band telephone channel at a rate of 2400 symbols/sec and assuming the noise to be white and Gaussian.

   (i)Determine the E_b/N_0 required to achieve an error probability of 10^{-5} at 4800bits/sec and 19200 bits/sec.

   (ii)What conclusions do you arrive from these results?   (4)

2. (a)   With necessary diagrams explain 8PSK and 8QAM.Highlight the differences between them.   (5)

   (b) Compare ASK,FSK and PSK.   (4)

3. The telephone line which is having a bandwidth of 3KHz is used for full duplex transmission of digital signals.What is the maximum rate of transmission(in bits per second)if, (a)ASK,(b)FSK (c)PSK is used.

Assume that only the fundamental component is permitted to pass through the telephone line.

(9)

PART B

4. (a) Explain the necessity of equalizing filter. (5)

(b) With necessary transfer function and block diagram explain zero forcing linear equalizer. (4)

5. (a) Explain FFT based multicarrier system with the help of block diagram (6)

(b) A total of 30 equal power users are to share a common communication channel by CDMA. Each user transmits information at the rate of 10kbits/s via DSS and BPSK. Determine the minimum chip rate to obtain the performance $E_b/J_0 = 10dB$. (3)

6. Explain an optimum receiver for the AWGN channel. (9)

PART C

7. A multipath fading channel has a multipath spread of $T_m = 1sec$ and a Doppler spread $B_{\alpha} = 0.01Hz$. The total channel bandwidth at bandpass available for signal transmission is w=5Hz. The signal designer selects a pulse duration T=10sec.

(a) Determine coherence bandwidth and coherence time.

(b) Is the channel frequency selective ? Explain. (12)

8. Explain the decorrelation receiver used for multi user detection. Draw the block diagram representation. (12)

9. Explain different Random Access Methods. (12)